Claims

A method of reliability testing comprising: [c1] providing a test structure; determining a critical breakdown resistance of the test structure, wherein the critical breakdown resistance of the test structure causes a circuit to fail; subjecting the test structure to stress conditions; repetitively determining an operating resistance of the test structure; and recording a critical breakdown time when the operating resistance of the test structure is equal or smaller than the critical breakdown resistance. The method of claim 1 wherein the test structure comprises a substrate and a [c2] dielectric layer formed thereon. The method of claim 2 wherein the dielectric layer comprises an oxide layer. [c3] The method of claim 2 wherein the test structure comprises the actual device. [c4] The method of claim 4 wherein the test structure comprises a transistor or [c5] capacitor. The method of claim 2 wherein the test structure comprises a capacitor [c6] structure. The method of claim 1 wherein the stress conditions comprise elevated [c7] voltages. The method of claim 7 wherein an elevated voltage is about twice an operating [c8] voltage. The method of claim 7 wherein the stress conditions comprise elevated [c9] temperatures or currents. The method of claim 1 wherein the step of determining the critical breakdown [c10]resistance comprises determining the critical breakdown resistance in a circuit environment under normal operating conditions. [c11] The method of claim 10 wherein the step of determining the critical breakdown

	resistance of the test structure comprises a circuit simulation.
[c12]	The method of claim 1 wherein the step of determining the critical breakdown resistance of the test structure comprises a circuit simulation.
[c13]	The method of claim 12 wherein the step of repetitively determining the operating resistance comprises determining the operating resistance after a significant change is detected in at least one electrical property.
[c14]	The method of claim 13 wherein the electrical property comprises current or voltage.
[c15]	The method of claim 13 further comprises repetitively determining the operating resistance after a time interval.
[c16]	The method of claim 15 wherein the time interval is predefined according to a stress duration.
[c17]	The method of claim 16 further comprising determining a maximum current after breakdown.
[c18]	The method of claim 1 wherein the step of repetitively determining the operating resistance comprises repetitively determining the operating resistance after a significant change is detected in at least one electrical property.
[c19]	The method of claim 18 wherein the electrical property comprises current or voltage.
[c20]	The method of claim 19 further comprises repetitively determining the operating resistance after a time interval.
[c21]	The method of claim 1 wherein the step of repetitively determining the operating resistance comprises repetitively determining the operating resistance after a time interval.
[c22]	The method of claim 21 wherein the time interval is predefined according to a stress duration.
[c23]	The method of claim 21 further comprising determining a maximum current

after breakdown.

- [c24] The method of claim 1 further comprising determining a maximum current after breakdown.
- [c25] The method of claim 1 further comprising computing a reliability of the test structure from the critical breakdown time.
- [c26] The method of claim 25 wherein the step of determining the critical breakdown resistance comprises determining the critical breakdown resistance in a circuit environment under normal operating conditions.
- [c27] The method of claim 26 wherein the step of determining the critical breakdown resistance of the test structure comprises a circuit simulation.
- [c28] The method of claim 27 wherein the step of repetitively determining the operating resistance comprises repetitively determining the operating resistance after a significant change is detected in at least one electrical property.
- [c29] The method of claim 28 wherein the electrical property comprises current or voltage.
- [c30] The method of claim 28 further comprises repetitively determining the operating resistance after a time interval.